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and Petroleum Resources

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To the Honourable JACK DAVIS
Minister of Energy, Mines and
Petroleum Resources
Parliament Buildings
Victoria, British Columbia

Sir:

I have the honour to submit the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for the time period of April 1, 1989 to March 31, 1990.

Yours truly,

John Allan
Deputy Minister

The Honourable David C. Lam
Lieutenant-Governor of British Columbia

May It Please Your Honour:

I respectfully submit the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for the time period of April 1, 1989 to March 31, 1990.

Jack Davis
Minister

Energy Resources Division

THE ENERGY RESOURCES DIVISION

Oversees the management of British Columbia's various energy resources and advises on energy policies and programs designed to:

- encourage economic development
- maintain environmental integrity
- balance current demands against future needs.

EXECUTIVE ADVISOR

Provides leadership and advice to the Minister, Deputy Minister and Energy Resources Division on key energy issues, policies and programs.

ASSISTANT DEPUTY MINISTER

MEDIATION AND ARBITRATION BOARD

Facilitates negotiations between petroleum operators and landowners concerning access to petroleum-bearing lands.

OIL AND GAS POLICY BRANCH

Develops and implements short- and long-term oil and gas energy policy. Co-ordinates reviews of development proposals as well as the use and removal of natural gas.

ENERGY PROJECT ANALYSIS BRANCH

Contributes to the sustainable development of British Columbia by conducting efficient and effective reviews of proposed energy projects through the Province's Energy Project Review Process.

ELECTRICITY POLICY BRANCH

Develops and implements government policies and strategies which affect the generation, sale, distribution and pricing of electrical energy in the Province. Ensures an adequate supply of electricity within the constraints imposed by economic, environmental and public policy considerations.

ENERGY MANAGEMENT BRANCH

Develops and administers policies and programs which promote the efficient use of energy in British Columbia. Prepares energy forecasts and statistical and economic analyses of energy issues. The Branch is comprised of two sections:

- Energy Efficiency
- Forecasts and Analysis.

PETROLEUM TITLES BRANCH

Manages Crown petroleum, natural gas, underground storage and geothermal rights in a manner that supports an active industry and provides for continuing economic benefit from resource development. Participates in resource planning and regulation to meet provincial environmental goals. The Branch consists of three sections:

- Lease Records
- Compliance and Accounts
- Drafting.

PETROLEUM GEOLOGY BRANCH

Carries out geological studies and provides information to the petroleum industry. The Branch consists of three sections:

- Regional Geology
- Geophysical
- Reservoir Geology.

ENGINEERING AND OPERATIONS BRANCH

Regulates petroleum industry field operations to assure safety, protection of the environment and resource conservation. It provides resource analyses, oil and gas reserves data and statistical reports, and assessments of provincial policies and requirements. The Branch includes:

- Development Section
- Reservoir Engineering Section
- Field Operations.

The Oil and Gas Industry in 1989/90

The Vancouver Island natural gas pipeline moved several steps closer to reality in 1989/90. The British Columbia Utilities Commission (BCUC) completed its analysis of the project and recommended that the Pacific Coast Energy Corporation (PCEC) project be approved. In the summer of 1989, an inquiry into technical and environmental matters of the pipeline route through the Coquitlam watershed was conducted.

The inquiry report, the BCUC report and comments from many federal, provincial and municipal agencies were incorporated in British Columbia's first Energy Project Certificate (EPC), issued in September 1989. The EPC contained 60 terms and conditions, with the vast majority related to environmental protection.

The Province, PCEC and seven pulp and paper mills concluded a Statement of Intent in November 1989. This agreement established the industrial market for natural gas on Vancouver Island.

Also in November 1989, the Province, PCEC and the federal government finalized the financial arrangements for the pipeline. With all the pieces finally in place, construction started in December 1989 with clearing and grading of right-of-way.

In April 1989, the Ministry initiated a review of its natural gas energy removal policy. The objective was to update Ministry policy and procedures to reflect the Free Trade Agreement, continued deregulation of the natural gas market and renewed industry interest in long term exports. By fiscal year end, the Ministry had completed its analysis and had commenced a consultation process with industry. The new policy is to be implemented in the fall of 1990.

Negotiations to transfer BC Petroleum Corporation's marketing operations to an independent group of B.C. natural gas producers, Canwest Gas Supply (1989) Inc., began. Canwest is expected to receive producer endorsement in the summer of 1990.

During 1989/90, increasing levels of industry activity in British Columbia continued to emphasize natural gas exploration and development — both in the traditional northeast sector and also in the southeast and the Lower Mainland. This emphasis was also reflected in Crown land sale activity and in record levels of geophysical field data acquisition.

Revenue from petroleum tenure administration amounted to $120 million in 1989/90. The industry focussed on the natural gas potential of the Province as tenure acquisitions were directed towards natural gas prospective areas such as the Foothills and the Ring/Border area and deep rights below existing fields in the Peace River area.

Energy Resources Division

In the summer of 1989, another seismic program was run in the Fraser Valley in anticipation of a public competition for petroleum and natural gas rights in that area. The rights disposition occurred in October, followed by an industry proposal in November for a three-well drilling program early in 1990. A public consultation program began with three open houses in the Fraser Valley, at which time local citizens expressed their concerns. Further activity has been delayed to allow public concerns to be identified and evaluated.

The most notable development during the year was the complete delineation of the Brassey Artex pools. A successful and fully miscible oil recovery scheme was initiated in these pools without first going through a primary production phase. The scheme includes re-injection of all produced gas.

Drilling development in the Ring Border field which straddles the British Columbia/Alberta border also added significant gas reserves in this pool.

Amoco Canada's Cypress gas plant, located 140 kilometres northwest of Fort St. John, began processing sour gas in November 1989. The plant is capable of processing 1,275 10^3m^3 a day of raw inlet gas with a sulphur recovery rate of 95 per cent.

Placer CEGO Petroleum started up their Boundary Lake gas plant in April 1989. The plant, located 35 kilometres northeast of Fort St. John, is capable of processing 563 10^3m^3 per day of sweet raw inlet gas and recovering 53 10^3m^3 per day of stabilized liquids.

Canadian Hunter completed its conversion of the Noel compression and dehydration facility to process raw gas in January 1990. The plant, located 100 kilometres south of Fort St. John, has a processing capacity of 4,250 10^3m^3 of sweet raw inlet gas.

The Oil Royalty Holiday Program finished on June 30, 1989, creating increased drilling activity in May and June. The Natural Gas Royalty Holiday Program for the Peace River area will end on May 31, 1990. This program also contributed to a very good drilling year for the Province.

Applications for gas exports increased significantly during the fiscal year. Plans were made to develop a gas administration management system to handle these requests more effectively.

Activity revived in the Fernie/Flathead area of southeast British Columbia — largely in response to emerging interest in the potential of the area for coal bed methane exploration and extraction.

Exploration activity also intensified along the British Columbia Foothills belt — from the Murray Field in the southeast to Beaver River in the northwest. This resulted in the casing for additional evaluation of potentially significant wells at Colgas PCI Crow (c-16-A/94-N-15); Texaco Cameron (b-48-L/94-B-9); Texaco Shell Gwillim (b-79-C/93-P-6) and BP NIM Sukunka (c-1-C/93-P-5). A stepout well to the Shell Boulder Baldonnel gas discovery was cased at (d-30-C/93-0-9).

In the northeast plains area, delineation drilling in the Ring Field increased potential gas reserves. Significant Slave Point and Jean Marie gas reserves additions were also made in the Hossitl and Helmet North Field areas.

Evaluation continued on the large land block assembled in the area southwest of Fort St. John by partners Esso, Canadian Hunter and Bow Valley Industries. A significant amount of new geophysical acquisition and drilling activity is anticipated for this area in 1990.

In the British Columbia interior, the Geological Survey of Canada, in consultation with Ministry petroleum geological staff, conducted geoscientific studies in both the Bowser and Nechako Basin areas. This work is focussed in part on determination of the hydrocarbon potential of these areas.

Interest in geothermal activity was also revived in fiscal 1989/90. This led to re-evaluation of the commercial potential of the geothermal resources of the Meager Creek area; commencement of drilling of a geothermal research well at Summerland by the Okanagan-Similkameen Community Futures Association; and expressions of interest in disposition of geothermal tenure in the Terrace area. In addition, the Ministry acquired an extensive collection of geothermal core obtained during B.C. Hydro's 1974/75 drilling program in the Meager Creek area. This material is stored and available for examination at the Charlie Lake field office.

The Ministry also participated in the World Energy Congress in Montreal in September 1989. Following the Congress, three separate delegate field tours visited British Columbia energy projects.

The Ministry continued to support environmentally sustainable economic development through participation in the highly successful GLOBE '90 Conference, held in Vancouver in March 1990. Planning assistance, funding, speakers, guides and exhibit materials were provided to the conference.

The Electricity Industry 1989/90

The provincial electricity strategy continued to provide a framework for the development and use of the Province's electricity resources. This strategy emphasizes planning and conservation initiatives which promote a more efficient use of existing resources, delaying the need for new higher cost generation projects.

As part of this strategy, a new electricity pricing policy was developed to provide pricing signals which will encourage conservation. In setting B.C. Hydro's electricity rates, the Province directed the BCUC to ensure that rate increases are smooth, stable and predictable, contribute to conservation and efficient electricity use and meet minimum financial standards.

In response to this policy, B.C. Hydro submitted a rate application to the BCUC. On April 30, 1990, the BCUC approved rate increases of three per cent effective November 15, 1989 and 1.5 per cent on April 1, 1990 and on April 1, 1991. B.C. Hydro plans to apply to the BCUC for approval to restructure rates so that conservation and efficient use of power is rewarded.

B.C. Hydro is now required to pay surplus revenues to the Province in order to encourage operational efficiency and to provide a return on public investment in the Corporation. The amount paid will reflect B.C. Hydro's current financial situation. Some portion of surplus revenue will continue to go towards the payment of debt. Once the building of new projects raises B.C. Hydro's costs, payments to government will decline.

In January 1990, the Province announced that the Canadian entitlement to the Columbia River downstream benefits would be repatriated as they become available. Starting in 1998, the United States must return "free of charge" this low-cost, environmentally clean resource to the British Columbia border. This may delay the need to build new generation capacity in British Columbia by two to three years. The Province is now in the initial stages of developing the structure under which the return of the downstream benefits will be negotiated with the United States.

The electricity strategy also emphasizes increased competition. In consultation with the Province, B.C. Hydro has developed a wheeling policy which allows independent power producers access to the provincial transmission system. Such access is an important element in increasing competition in the electricity industry since it allows producers to sell power directly to their customers.

B.C. Hydro will continue to issue proposal calls for independent producers interested in supplying power to the B.C. Hydro integrated system, or to non-integrated areas presently served by B.C. Hydro diesel operations. Agreements in principle have now been reached with NW Energy Corp. for a 55 megawatt woodwaste-fired project in Williams Lake, and with Westcoast Energy Inc. and C.U. Power for a 105 megawatt gas-fired co-generation project at Taylor, near Fort St. John. The Williams Lake project eliminates the use of beehive burners for the disposal of woodwaste.

In recognition of the environmental benefits which may be associated with independent power projects, B.C. Hydro, at the Province's direction, may pay a premium of up to 15 per cent for energy from developments which result in a significant improvement in local environmental conditions external to the power facility.

In October 1989 B.C. Hydro and Howe Sound Pulp and Paper Limited announced an agreement whereby B.C. Hydro will provide financial assistance by way of a $108 million interest-free loan, repayable in 1995, for the construction of a 85 megawatt generating facility. The project will also provide significant environmental benefits by utilizing woodwaste that is currently being disposed of in landfills or incinerated in beehive burners.

The new generating facility will supply 70 per cent of the mill's electricity needs; the balance will be purchased from B.C. Hydro. The agreement will provide economic benefits to both B.C. Hydro and Howe Sound Pulp and Paper. Within the framework of B.C. Hydro's Load Displacement Program, industry is being encouraged to install its own electrical generation capacity, enabling B.C. Hydro to defer construction of new facilities.

Major electricity users in British Columbia will also have an opportunity to purchase short term, interruptible power at competitive market prices under a new power pooling arrangement being developed by the B.C. Power Export Corporation (POWEREX). This initiative should lead to further growth and improved efficiencies in the industry.

POWEREX continued negotiations with the Bonneville Power Administration to improve access to their transmission system to facilitate firm power exports by independent producers to the United States. Discussions are also underway with two Pacific Northwest utilities concerning the construction of additional transmission capacity to facilitate exports.

Energy Projects in Review

Energy project review activity increased significantly during the year.

Seventeen proposals were submitted in response to B.C. Hydro's proposal call for domestic electricity supply.

B.C. Hydro's request for proposals for projects of less than five megawatts resulted in the submission of 14 small hydro proposals. Energy Project Certificate Applications (EPCAs) are expected from all successful proponents by early 1991.

In the spring of 1990, B.C. Hydro also issued a proposal call for a geothermal demonstration project. Several companies responded, including Canadian Crew Energy Corporation, whose interests are in the Meager Creek area near Pemberton.

In anticipation of future B.C. Hydro proposal calls, Forest Fuels Inc. (Midway woodwaste) submitted a Prospectus and Weyerhaeuser Canada Ltd. briefed the Ministry on its plans for a co-generation facility at its Kamloops pulp mill.

POWEREX also received 17 proposals as a result of their call for proposals for export projects. Five of these proponents entered negotiations for export contracts and attended preliminary meetings with government. Formal EPCAs are expected from proponents in late 1990 or early 1991.

In addition, there was an increase in activity in the exploration and production of natural gas in northeastern British Columbia. This resulted in an increased need for gas plants in the northeastern region of the Province to process and deliver natural gas to domestic and export markets.

In 1989/90 there were six EPCAs reviewed and approved by the Ministers of Energy and Environment. One was for the Vancouver Island natural gas pipeline and the remaining five were for gas processing plants.

In addition, B.C. Hydro's Williston-Kelly Lake 500 kilovolt transmission line EPCA was referred to the BCUC; B.C. Hydro was subsequently issued a Certificate of Public Convenience and Necessity for the project.

Energy Policy Initiatives

The government has identified four central and inter-related themes for energy policy in the 1990s. The first two themes, Efficient Energy and Clean Energy, reflect our new priorities. The second two themes, Secure Energy and Energy for the Economy, are continuing goals from the early 1980s.

Efficient Energy: Cutting energy waste lowers consumer energy bills, benefits the environment, and makes British Columbia industry more competitive.

Clean Energy: Shifting to cleaner fuels and reducing the environmental impacts of energy supply and use will help the quality of our air, water, and other natural resources.

Secure Energy: Managing existing resources effectively, finding new sources of supply, increasing fuel choice for consumers, and maintaining the quality and quantity of energy supplies will ensure long-term energy security for the Province.

Energy for the Economy: Developing energy resources across British Columbia will stimulate regional growth and bring economic benefits to the Province as a whole.

In 1990/91, the Ministry will be releasing an energy policy document entitled "New Directions for the 1990s" which describes a number of current initiatives in energy policy as well as some changing issues and initiatives for the decade ahead.

Highlights

Oil and Gas Policy Branch

Initiatives of the Branch included the financial, legislative and industrial agreements necessary to facilitate construction of the natural gas pipeline to Vancouver Island, and the review of the natural gas energy removal policy.

Sixty-six Energy Removal Certificates (ERCs) were processed during the 1989/90 fiscal year. Of these, two long-term firm, 24 short-term firm and 31 short-term interruptible ERCs delivered 138.6 petajoules (PJ) (3,583.3 $10^6 m^3$) of natural gas to the United States. In addition to these volumes of gas, 27.3 PJ (703.4 $10^6 m^3$) of gas were removed from the Province under a National Energy Board Export Licence held by Westcoast Energy Inc. The majority of this gas was destined for Washington, Oregon and California. The remaining nine ERCs, one long-term firm and eight short-term interruptible, removed 14.0 PJ (356.8 $10^6 m^3$) of gas from British Columbia for delivery to Canadian markets, mainly in Ontario.

Staff participated in the U.S./British Columbia Oil Spill Task Force, initiated following a barge spill off Greys Harbour, Washington and the subsequent tanker spill in Alaska's Prince William Sound. The task force, led by the Ministry of Environment, submitted a preliminary report in December 1989. The final report is expected in July 1990.

Staff participated in the provincial Oceans Policy Committee, formed in response to federal initiatives related to oceans policy in Canada. Ministry concerns relate to potential mineral and oil and gas activity, international boundaries and jurisdictional issues.

In October 1989, the Branch initiated negotiations with Canwest Gas Supply (1989) Inc. over the acquisition by Canwest of the B.C. Petroleum Corporation's marketing operations.

Electricity Policy Branch

In early 1990, Phase II of a joint B.C. Hydro/Alberta Interconnected System (AIS) Generation Co-ordination Study was completed. Phase II focussed on the transmission systems in British Columbia and Alberta, and identified the transmission capacity requirements and related costs, to support the co-ordination of both systems. The study concluded that approximately $400 million in co-ordinated operation benefits could be achieved over the existing and planned transmission network in the next 20 years. This is in addition to the benefits of co-ordination in resource planning which could yield benefits ranging from $600 million to $1.2 billion during the 1990 to 2010 period.

The Branch is also active in supporting new generating facility project agreements between B.C. Hydro and industry.

Energy Project Analysis Branch

The Branch's efforts in 1989/90 focussed on the Vancouver Island pipeline and B.C. Hydro's and POWEREX's various calls for independent power proposals. This included the co-ordination and review of 14 projects and, in conjunction with the Ministry of Environment, the development of a review process for small hydro projects.

A variety of project proposals were reviewed in the fiscal year as part of the Energy Project Review Process. Among them were five gas processing plants, three small hydro projects and 17 independent power producer proposals.

Five proponents, expressing interest in the electricity export market, initiated discussions with the Province. As well, 10 other proposals were reviewed as part of POWEREX's short-listing procedures for independent power producers. The Branch also reviewed eight transmission and other projects.

Branch staff were also involved in a number of special projects, the most significant of which are the development of a provincial carbon dioxide (CO_2) inventory, a strategy for developing hydrogen technology and a hydrogen bus demonstration, and a preliminary design study for a Clean Energy Program for British Columbia.

Energy Management Branch

The Energy Management Branch was established in 1989/90 from the former Forecasts and Special Projects Branch. Branch activities during the year focussed primarily on the Ministry's emerging role as a leader in the areas of energy efficiency and conservation.

Several major projects were initiated by the new Energy Efficiency Section. An assessment of the potential for improved energy efficiency in residential and commercial buildings resulted in the launch of a joint building standards development project with B.C. Hydro. The standards developed by the project will be proposed for inclusion in the 1992 B.C. Building Code.

A study of the potential for energy efficiency improvements in appliances and other equipment resulted in the preparation of draft legislation requiring that new household appliances, electric motors and lighting equipment meet minimum energy efficiency standards. Other projects included studies on demand side management in Canada and on the potential for improving the energy efficiency of transportation in British Columbia.

The Branch also shares responsibility with other energy branches for the Vancouver Island natural gas pipeline project. During 1989/90 the branch developed conversion assistance programs for residential, commercial and industrial customers of the pipeline for launch in the summer of 1990. Other pipeline-related activities included extensive financial and economic analysis of the project.

The Branch's Forecast and Analysis Section conducted numerous economic analyses during the year, including an evaluation of the impact of the proposed Federal Goods and Services Tax on energy demand and an assessment of the sensitivity of energy use to changes in energy prices. As well, the Energy Price Forecast and a preliminary long-run Energy Supply and Requirements Forecast were completed, with publication expected in the fall of 1990.

Several continuing projects have been enhanced. The Energy Sector Update (a quarterly provincial energy review) was completely restructured and will be targeted for wide circulation. The methodology for forecasting natural gas royalties was also updated to improve accuracy, and the Ministry's energy demand and energy price forecasting models were also upgraded.

Petroleum Titles Branch

Crown petroleum and natural gas tender bonuses, although slightly down from 1988, maintained a steady growth over previous years. The total number of petroleum and natural gas tenures administered by the Branch as of March 31, 1990 increased by 100 over the same date in 1989 covering an additional 100,000 hectares of petroleum and natural gas rights. Key areas of tenure acquisition were:

- the Boulder-Sukunka-Murray foothills area where interest was directed toward gas;
- deep rights below existing fields in the Peace River Area;
- areas prospective for gas in the Jean Marie formation northeast of Fort Nelson; and
- the Ring/Border area where the target was shallow gas.

In response to industry requests, preparations were made to offer petroleum and natural gas rights for competition in the Fraser Valley. Presentations were made to municipal governments, elected representatives and other provincial government agencies, briefing them on the disposition process and the regulatory framework surrounding exploration and development of petroleum and natural gas. Extensive research was carried out in conjunction with the Ministry of Crown Lands to determine the ownership of petroleum and natural gas rights in the Fraser Valley. The competition was held October 25, 1989, and of the 15 parcels offered in the Valley, bids were accepted on 10 for an average tender bonus of $461 per hectare.

Natural gas market deregulation and the favorable geologic potential for natural gas discoveries in British Columbia provided the stimulus for increased industry activity in the Province.

Work continued in conjunction with the Petroleum Geology Branch on modification of stratigraphic zone designations to define more clearly the rights conveyed by petroleum and natural gas tenures.

Phase I of the Petroleum Titles computer system upgrade was substantially completed. New software was developed to run on the British Columbia Systems Corporation VAX network which improved the Branch's effectiveness in managing petroleum titles information and ability to disseminate it to the public and to the petroleum industry. The planning of Phase II of the project was initiated which will result in the automation of the Branch's accounts function.

Petroleum Geology Branch

In 1989/90 the Branch completed or made significant progress on all key Branch business plan issues and embarked upon several significant new initiatives.

In response to new development drilling activity, the Reservoir Section conducted major geological reviews in the Brassey, Ring, Sukunka, Bullmoose, Noel-Sundown, Boundary Lake, Hossitl and Flatrock West Fields. The Section also further refined the Zone Designation System; produced a new annual publication "Unit, Scheme and Conservation Order Outlines"; and made progress with selection, purchase and installation of a geological workstation. This system will streamline well and pool evaluation procedures and assist in the automation of Branch drafting requirements.

An important new regional study on the hydrocarbon potential of the Artex member was initiated and is expected to be published in September 1990 as the first volume in a new petroleum geology publication series. The Branch hopes to produce future volumes in this series at a rate of several volumes per year.

Branch staff contributed technically to three significant new geological studies — the "Geological Atlas of the Western Canada Sedimentary Basin"; the "Lexicon of Canadian Stratigraphy"; and "Natural Gas Resources of Western Canada." In addition, ongoing joint project initiatives were undertaken with the Geological Survey of Canada (GSC), Canada Oil and Gas Lands Administration, and the Coal Subsection of the B.C. Geological Survey. The GSC/EMPR co-funded production of a comprehensive database and mapping project on geothermal resources in British Columbia is targeted for publication in late 1990. The Branch also participates in the GSC/EMPR Joint Geoscience Planning Committee.

An exhibit and new promotional/informational materials were completed and presented at the annual meetings of the Canadian Society of Petroleum Geologists, the Canadian Association of Petroleum Landmen, and the annual Cordilleran Roundup.

The Branch embarked upon a key new initiative involving detailed analysis of geological and gas reserve data submitted in support of Energy Removal Certificate applications. Significant contributions were also made to a Ministry natural gas strategic planning workshop, the provincial exhibit at the World Energy Congress, the Whistler Seminar on natural gas opportunities in B.C., and the recently concluded and highly acclaimed Royal British Columbia Museum "Rocks, Rigs and Roughnecks" exhibit.

Engineering and Operations Branch

The Branch experienced a very active year, both in terms of reacting to near record levels of industry activity as well as expanding its size and capabilities.

Key personnel were recruited for both the Fort St. John and Victoria offices. Technical staff involved in drilling, facilities and reservoirs were added to the Branch to increase productiveness and extent of knowledge.

A major review of the Drilling and Production Regulation was undertaken to ensure that the Regulation was clear, current and complete.

Both the Gas Administration Management System (GAMS) and the Petroleum Information Management System (PIMS) projects received approval and plans were developed to implement these database improvements beginning in 1990/91.

The Branch played an active role in the technical approval process associated with gas plant assessments and became more active in reviewing environmental aspects of the applications. Many new facilities were approved this year as natural gas activity was the focus of interest in the Province.

The Development Section automated its well authorizations approval process. The Reservoir Section was active in the review and approval of major reservoir schemes such as Brassey and Noel.

The Fort St. John district office continued its database improvements to the well inspection system, which increases effectiveness in dealing with approvals for wells, facilities, new construction, and abandonments. The suspended well program has been implemented to ensure wells do not become "orphan" wells with their associated problems of site restoration and liability of oil spills.

The district office completed a report on sour gas emissions in October 1989. The project, initiated to identify odor emission problems, was completed by a working group consisting of members of the Branch, the Canadian Petroleum Association, the Ministry of Environment and Environment Canada. The report details methods of prevention of emissions, environmental protection and energy conservation.

The district office continued to enhance its field inspection program and its capability to store drilling- and production-related information.

Petroleum Titles Activities

Activity — Titles Administered	as of March 31, 1989		as of March 31, 1990	
	Number	Hectares	Number	Hectares
Permits	112	1.3 million	98	1.2 million
Leases	6,587	3.5 million	6,592	3.4 million
Drilling Licences	318	0.9 million	449	1.1 million
Totals	7,017	5.7 million	7,139	5.8 million

Provincial Revenue from the Petroleum Industry ($ Millions)

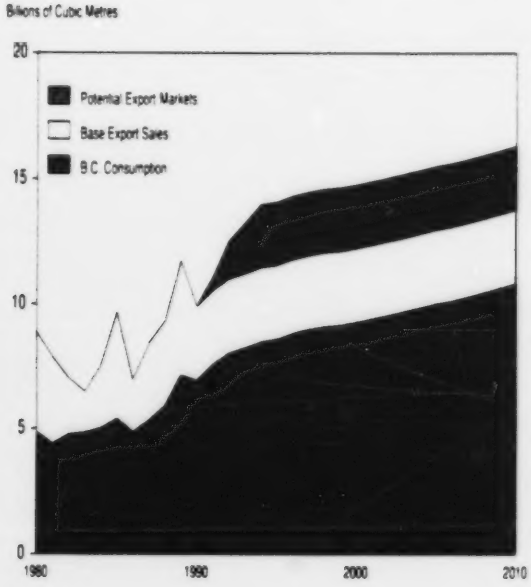
	1987/88	1988/89	1989/90
Rentals and Fees	35	33	33
Crown Reserve Dispositions	59	112	87
Oil Royalties	52	38	42
Natural Gas and Natural Gas By-Product Royalties	59	58	63
Totals	205	241	225

Value of Hydrocarbon Production ($ Millions) — value to the producers at the wellhead

	1987/88	1988/89	1989/90
Crude Oil	291	211	287
Natural Gas	379	371	472
Natural Gas By-Products	22	16	30
Totals	692	598	789

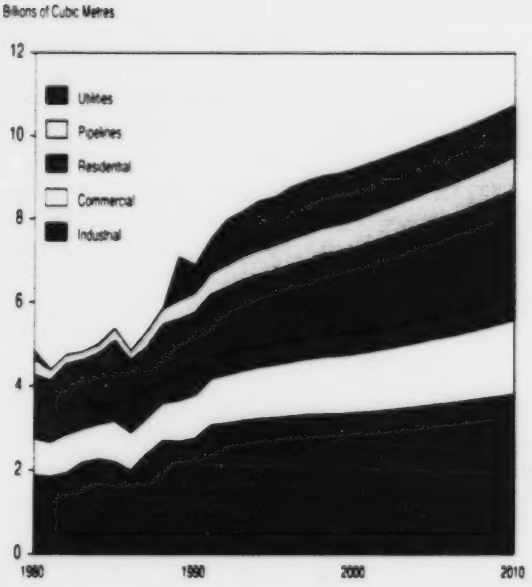
Energy Resources Division

Natural Gas Production and Exports



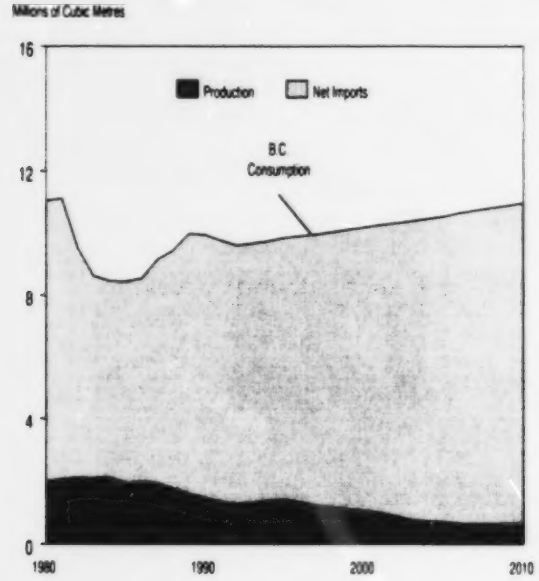
- Sufficient reserves are available to support the development of new export and domestic markets well into the 21st century.
- Domestic burner-tip prices for gas average $4.60 per GJ for residential customers and $2.00 per GJ for industrial customers.
- Deregulation and declining productive capacity in the U.S. have opened new market opportunities for B.C. gas producers.
- B.C.'s base export sales are all to the Pacific Northwest — our traditional market.
- Potential sales to California could boost production to 14 billion cubic metres in the mid-1990s.

Natural Gas Consumption Trends



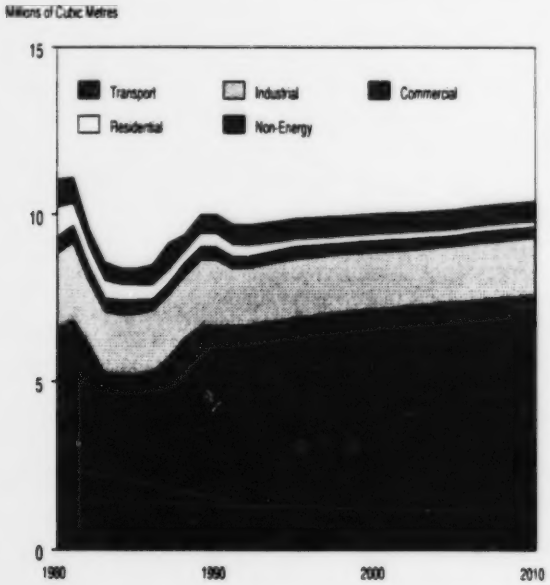
- Domestic natural gas consumption increased 3.5 per cent per year between 1980 and 1989.
- Demand is projected to increase by 2.4 per cent per year to the year 2010, including sales to the Vancouver Island natural gas pipeline.
- Total natural gas requirements include end-use consumption, pipeline fuel and gas burned in thermal plants to generate electricity.

Oil Supply and Demand



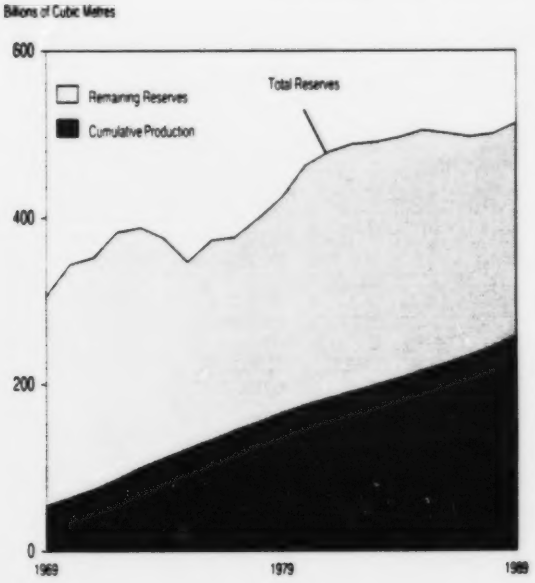
- B.C. depends on Alberta for approximately 75 per cent of its oil supply.
- Declining provincial reserves will result in future increases in imports from Alberta or offshore.
- A large oil discovery in 1988 at Brassey will help to slow the decline in production.
- Total B.C. refining capacity stands at about 9.7 million cubic metres per year.

Petroleum Product Consumption Trends



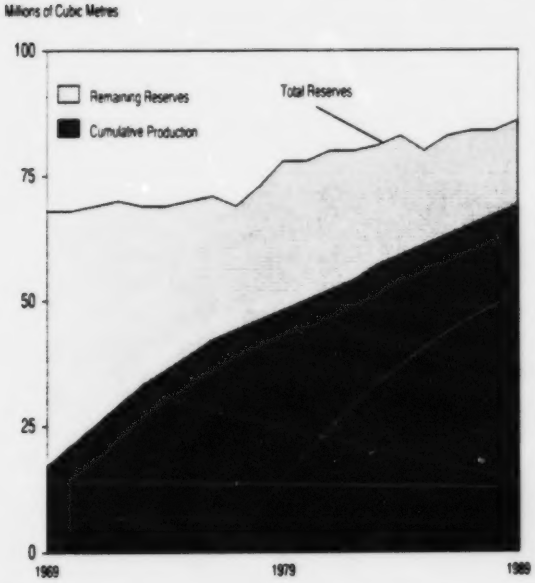
- Over 60 per cent of petroleum product demand in B.C. comes from the transport sector.
- While oil has largely been replaced in other uses by electricity and natural gas, there are few economical substitutes for gasoline.
- Transportation requirements are projected to increase by 0.6 per cent per year to the year 2010.
- The Vancouver Island pipeline will displace heavy fuel oil in seven pulp mills and light heating oil in the residential/commercial sector. A total of 0.4 to 0.6 million cubic metres per year will be displaced.
- Total petroleum product consumption is expected to remain stable.

Growth in Raw Gas Reserves



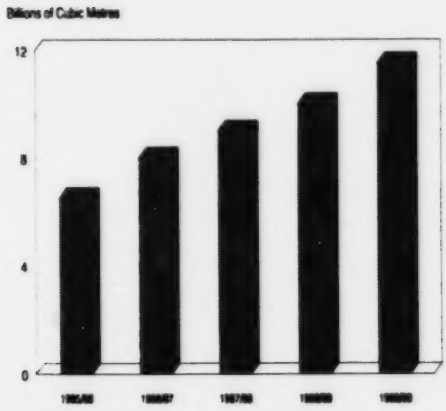
- Largest notable gas discovery was in the Ring Border area.
- Annual production was offset by reserve additions due to drilling.
- Drilling activity for gas was the highest since 1981.

Growth in Oil Reserves

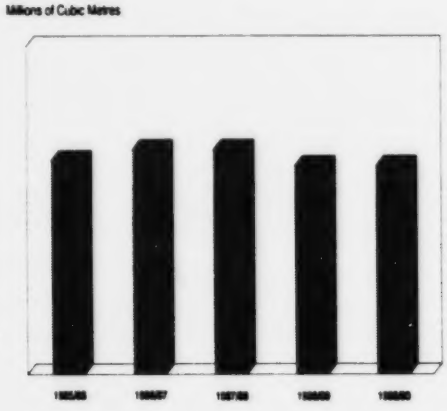


- Pool delineation and implementation of a pressure maintenance scheme in the Brassey field resulted in significant reserve additions.
- Reserve additions due to drilling and revisions were more than double annual oil production.

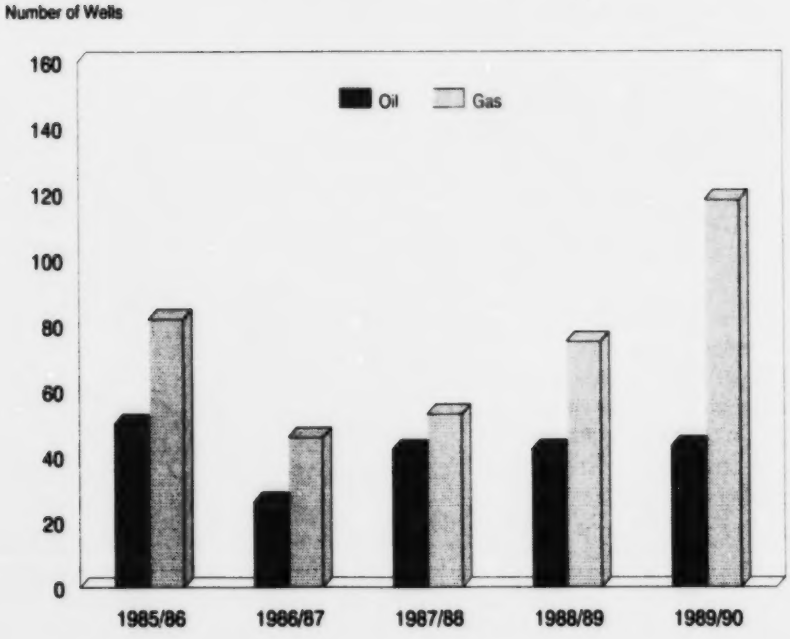
Marketable Gas Production



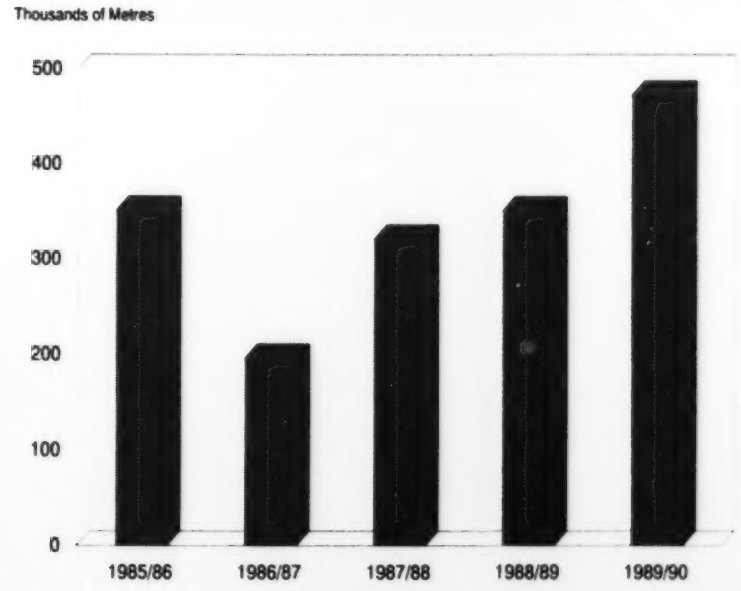
Oil Production



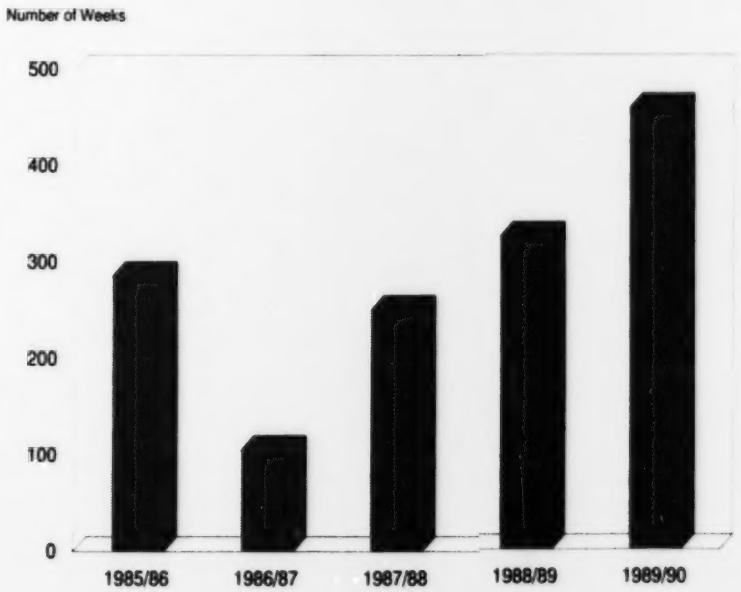
Number of Wells Drilled



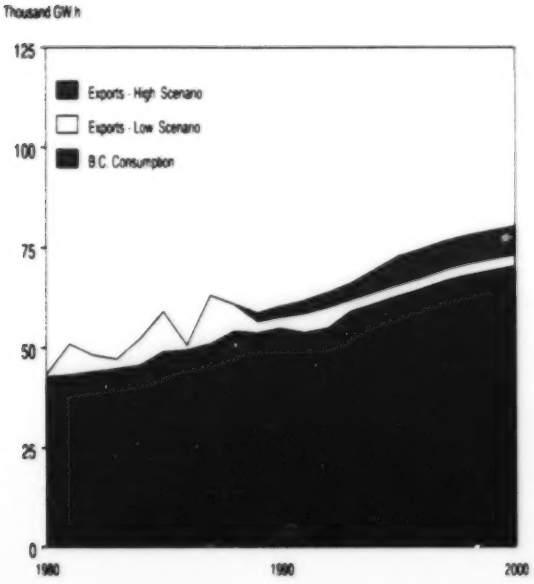
B.C. Petroleum Industry — Metres Drilled



B.C. Petroleum Industry — Geophysical Crew Weeks

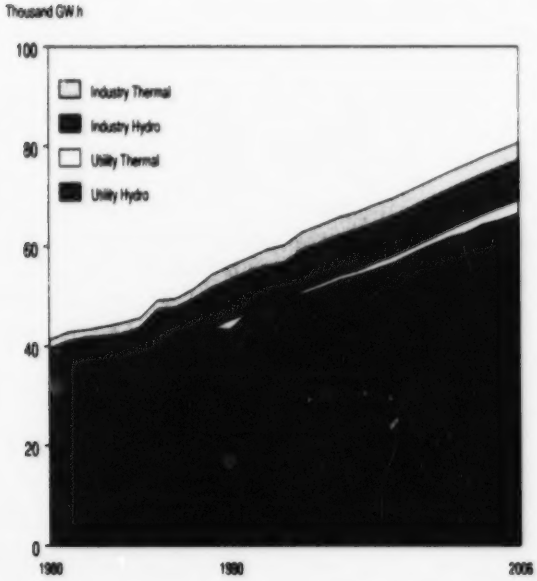


Electricity Supply and Demand



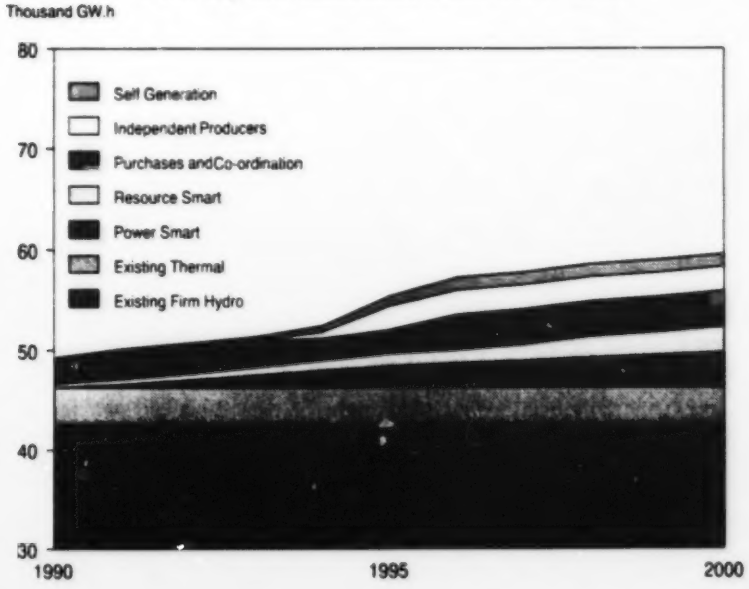
- In 1989, British Columbia produced 61,000 GW.h of electricity.
- Exports have varied significantly over the past 10 years — the average level is 6,000 GW.h per year.
- Increased firm electricity exports are likely in the 1990s but will require improved access to markets in California.

Electricity Generation



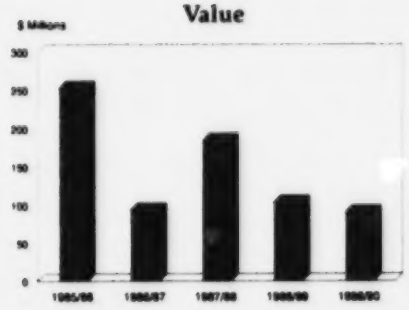
- Hydroelectric generation accounts for 95 per cent of all electricity production in B.C.
- B.C. Hydro and West Kootenay Power are the major utilities and together produce 85 per cent of all B.C. hydroelectricity.
- Utility thermal generation is small but is expected to play a larger role.
- Major industrial hydroelectric producers include Alcan, Cominco, and coastal pulp mills.
- Pulp and paper mills account for most industrial thermal generation. The mills co-generate power and steam from wood-waste, heavy fuel oil, natural gas and pulping liquors.

B.C. Hydro Resource Plan 1990–2000

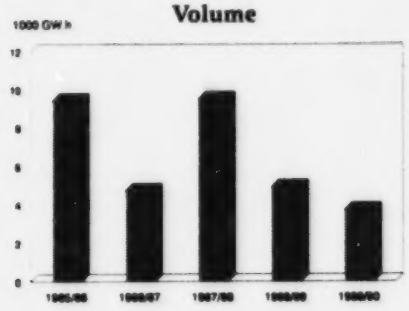


B.C. Hydro Electricity Exports

Value

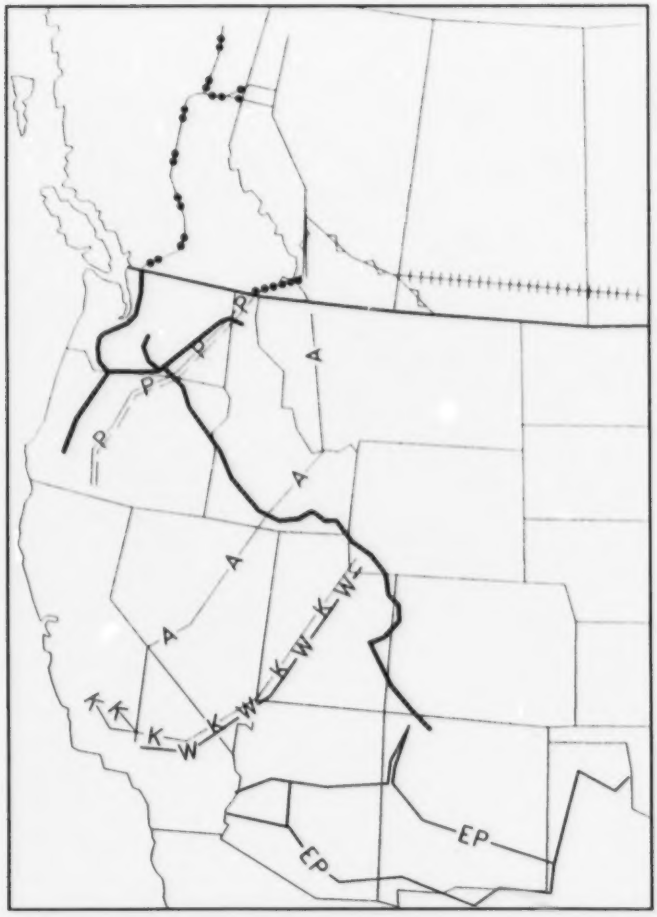


Volume



- Historically, B.C. Hydro has exported interruptible electricity to the U.S.
- Interruptible exports are highly variable, and depend primarily on streamflow conditions in the U.S. and B.C.
- POWEREX, a B.C. Hydro subsidiary, is responsible for marketing long term firm exports from British Columbia.
- Wheeling, shaping, standby, and other services will be provided by B.C. Hydro to POWEREX.

Major Western North American Gas Pipelines



Existing Pipelines

- Westcoast Energy
- Foothills Pipe Lines
- Nova Corporation
- Alberta Natural Gas
- Transcanada Pipelines
- Northwest Pipeline
- Pacific Gas Transmission
- —EP— El Paso

Proposed Pipelines

- —A— Altamount
- —W— Wycal
- —P— P.G.T. Expansion
- —K— Kern River

Mineral Resources Division

THE MINERAL RESOURCES DIVISION

The Division is responsible for all aspects of the management of the Province's mineral resources, including coal, metals and structural materials.

ASSISTANT DEPUTY MINISTER

MINERAL POLICY BRANCH

The Branch develops policies, programs and strategies for the management of British Columbia's coal and mineral resources, in support of provincial environmental and economic objectives. It advises on economic factors affecting the mineral industry and develops land use policies and financial incentives to assist development of new mines and infrastructure. There are three sections in the Branch:

- Economic Policy and Analysis
- Program Development
- Mineral Land Use.

GEOLOGICAL SURVEY BRANCH

The Branch provides information on the geology and mineral resources for land and resource management. It also carries out reconnaissance and detailed geoscience studies throughout the Province and maintains a province-wide inventory of mineral deposits and occurrences. Detailed studies focus on the origin of mineral deposits and the identification of favorable prospecting areas. Research data are made available to industry and the public through a range of scientific and technical publications. The Branch administers the Geoscience Research Grant, Financial Assistance for Mineral Exploration and the Prospectors' Assistance programs. There are four sections in the Branch:

- Environmental Geology
- Resource Data and Analysis Section
- Mineral Deposits and Regional Mapping
- District Geology and Coal Resources.

ENGINEERING AND INSPECTION BRANCH

As mandated in the Mines Act, this Branch ensures worker health and safety, public safety, mine reclamation, and the maximum economic extraction of mineral and coal resources based on sound engineering practices. The Branch also facilitates an orderly review and approval process for new mining proposals in B.C. To accomplish these goals, the Branch maintains a network of district offices and specialists and has nine sections:

- Health and Safety Standards
- Environmental Control Engineering
- Mechanical Engineering and Materials Handling
- Emergency Preparedness
- Inspection Services
- Development Review and Approvals
- Reclamation
- Geotechnical Engineering
- Mining Roads.

MINERAL TITLES BRANCH

Administers laws and regulations pertaining to the acquisition and maintenance of mineral tenures. Provides the best possible level of service to other agencies of government, the mining industry, and the general public. This is achieved by supporting the promotion of exploration and development of the Province's mineral resources through the efficient administration of secure title to Crown mineral and coal lands. The Branch has four sections:

- Vancouver Operations
- Tenure Administration
- Mineral Land Administration
- Branch Administration.

The Mining Industry in 1989/90

The Canadian mineral industry experienced another healthy year in 1989/90, despite weakening prices for most base metals. On average, prices still remained above 1988 levels and most mining companies were able to maintain acceptable profit margins. The high Canadian dollar had some negative effect on Canada's export trade, but the effect on the mineral industry was diminished by strong demand for base metals.

The total value of minerals produced in British Columbia was $3.2 billion, unchanged from 1988. Coal contributed over $1 billion to the overall total, and remained the most valuable mineral product. Copper production, also valued at over $1 billion, continued to provide the largest share of total metal value.

While the coal industry was assisted by continued firm international demand for metallurgical coal, the high exchange rate of the Canadian dollar vis-a-vis the U.S. currency has had a significant negative impact on the financial condition of the industry. Coal production increased almost three per cent in 1989, and higher average coal prices contributed to a six per cent increase in the value of coal production. These gains were made in spite of labor strikes at the Fording, Quintette and Line Creek mines.

The Quinsam thermal coal mine on Vancouver Island continued to increase sales to industrial and utility customers. Work was begun to upgrade the port facility on Texada Island. When operational, it will be capable of loading ships of up to 70,000 tonnes and will eventually handle as much as 500,000 tonnes of Quinsam coal annually.

Copper producers enjoyed strong prices again in 1989, but the value of copper production declined by nearly 10 per cent as less copper was shipped. Lower copper volumes resulted from work stoppages at both the Highland Valley Copper and Gibraltar mines. Afton Operating Corporation developed the Ajax deposit to replace depleted pits and BHP-Utah proceeded to extend the pit rim at the Island copper mine to increase mine life by four years to 1996. Highland Valley Copper completed the rationalization of its operations by relocating the former Highmont mill to the Lornex mill site and closing the older Bethlehem mill. Milling capacity rose from 120,500 to 131,000 tonnes per day.

Molybdenum prices declined slightly in 1988/89 due to large production increases by both primary and secondary producers in North America. Considerable capital investment at the Endako mine resulted in increased productivity and improved quality. The Brenda mine continued to operate, but closure in mid-1990 is anticipated due to ore depletion.

Mineral Resources Division

Prices for zinc were high, contributing to an increase in the value of production of nearly 25 per cent in 1989. Lead fell in both price and volume. The Sullivan mine at Kimberley was closed for an indefinite period of time on January 31, 1990 due to a labor dispute. Cominco Ltd. completed an 18,000 tonne expansion of its zinc refinery in Trail, raising capacity to 290,000 tonnes per year. The $171 million modernization of the lead smelter was also completed, and the new smelter started up in December. However, some technical problems were encountered, forcing the smelter to close for mechanical repairs and technical modifications.

Cassiar Mining Corporation became a wholly-owned subsidiary of Princeton Mining Corporation in December, 1989. The company's open pit asbestos mining operations were completed by mid-year, but product output continued at normal rates using ore stockpiled while the pit was still in operation. Advances continued on the development of the McDame underground deposit which is expected to come into production in mid-1990. Fibre produced from the wet processing operation is being sold for specialty products and has been well received in the market place.

After reaching record levels of $192 million in 1987 and $206 million in 1988, exploration expenditures are estimated at $140 million in 1989. This decrease is due to softening gold and silver prices through much of the year and the virtual demise of flow-through financing. Interest in precious metals was significantly buoyed in August by spectacular drilling results from the Eskay Creek property in the Iskut River area. Large base metal deposits such as Windy Craggy, Mount Milligan, Mount Polley and Cirque continued to be the object of very large surface drilling and underground exploration programs.

Both the Samatosum mine and the Premier mine opened in mid-1989, and the first gold bar was poured at the Golden Bear mine in February 1990. Ore from the Shasta property is feeding the old Baker concentrating facilities which were reactivated and expanded early in 1990. The Sulphurets and Snip projects continue to plan production decisions.

Highlights

Mineral Policy Branch

The Branch was expanded in January, 1990, with the addition of the Mineral Land Use and the Program Development Sections, which were formerly part of the Geological Survey Branch.

During the year, the new Mineral Tax Act became the major piece of provincial legislation for the assessment and payment of coal and metallic mineral taxes in British Columbia. The previous regime had been under review since the 1988 Speech from the Throne. The Act was proclaimed in December, 1989, and consolidated four provincial tax regimes into one. Specifically, the Mineral Resources Tax Act was repealed, as were sections in the Coal Act relating to the coal royalty. Also, the Mineral Land Tax Act and the Mining Tax Act were appropriately amended. The new tax system simplifies administration, encourages investment in new mines and fosters improved reclamation at old ones.

The Ministry completed a detailed benefit-cost study of the proposed mining road into the Iskut and Unuk regions of northwestern British Columbia. A previous study had defined a corridor from the Stewart-Cassiar highway to the developing mining camps in the Iskut-Unuk area and was jointly funded by the provincial and federal government and several mining companies. The study concluded that the road was an economically viable project, and that significant economic benefits and positive regional economic impacts would result from its construction. The Iskut Road is the subject of ongoing industry/ government discussions.

The Mine Closure Task Force developed an action plan to both minimize the impacts of mine closures and stimulate alternative mining and non-mining economic development opportunities. The task force identified 14 major mine closures that are anticipated before the year 2000. The 14 mines employ 4,100 workers with a combined annual payroll of $200 million. The task force recommended the establishment of an advance warning system to give government and communities adequate time to prepare for permanent mine closures. An implementation strategy is under development.

Mineral Resources Division

An inter-ministerial task force on resource roads, chaired by the Ministry of Transportation and Highways, was formed in October, 1989, to make recommendations to Cabinet regarding the appropriate steps to take to rationalize the policies, administration and legislation pertaining to resource roads in the Province. Following extensive study and discussions, the task force identified 20 main issues of concern to government and industry. These issues are under further study.

The Branch chaired a federal/provincial working group sub-committee formed to investigate the issue of native participation in mining. The overall goal is to identify measures which could be undertaken by native people, exploration and mining companies, unions and governments to bring about greater participation of native people in all aspects of the Canadian mining industry.

In British Columbia, all mines are required to carry out an approved reclamation plan and must post security to protect the Province from the risk of a company defaulting on its reclamation obligation. During the year, the Branch examined a new form of reclamation security called a mine-specific reclamation fund to address the particular situation of a single-mine company facing a significant, long-term reclamation expense. British Columbia will be requesting that the federal government review the Income Tax Act with the objective of explicitly stating that all company contributions to provincially mandated mine-specific reclamation funds be deductible for tax purposes.

Geological Survey Branch

The Branch's 1989 field program continued at a high level with 35 projects supported by the Province and five by the Canada/B.C. Mineral Development Agreement which expired in the spring of 1990.

Geological mapping at 1:50,000 scale continued in areas where the geology is unknown and underexplored or complex and poorly understood. Programs were active in the Stikine, Iskut, Cassiar, Manson Creek, and Bralorne areas.

The mineral deposits program focussed on base and precious metal projects. The Rossland, Alaskan Ultramafic and Iskut projects continued with field studies. Quesnel, Hedley and Bralorne project final reports are in preparation. New projects are examining skarn deposits, beginning in the Insular belt, and the association of gold with listwanite-altered ultramafic rocks.

The industrial minerals program continued to build the provincial database. Field-based inventories of barite, perlite, and vermiculite were completed. Compilation studies reviewed data on the known occurrences of chromite, limestone and dolomite, feldspar, and wollastonite.

The mandate of the Environmental Geology Unit includes data acquisition of the unconsolidated surficial layer where most of man's activities are concentrated, stimulation of exploration activity, and public education by increasing local awareness and knowledge of Quaternary geology. A number of new programs augmented ongoing research, including a continuation of a placer gold study in the Cariboo District and compilation of a provincial placer database. A new drift exploration program was started in central and northwestern B.C. as well as a new surficial mapping program in the northeastern part of the Province. Geological hazards are a real threat in B.C.; the unit began a field study of earthquake potential centred on Vancouver Island.

The Regional Geochemical Survey of southern Vancouver Island and the adjacent mainland was completed during the summer. Where appropriate, moss mats or silts and water samples were collected. Data from northern Vancouver Island were released in July, 1989 and revealed a number of interesting anomalies that led to staking.

The Coal Resources Unit continued to study and compile data on the quality of the Province's coals, and published the first edition of the "British Columbia Coal Quality Catalogue." The small diameter drilling program initiated to collect unoxidized samples of coal for rank and quality studies was very successful and continues with the co-operation and support of the Geological Survey of Canada. In addition, field studies continued in the northeast coalfields and on Vancouver Island with particular emphasis on the coalbed methane potential of those areas.

The five district geologists continued to monitor mineral exploration and development highlights and trends in the Province, carry out property visits and conduct metallogenic studies on precious and base metals. Geological studies of properties and mining camps were carried out from northwestern British Columbia to the extreme southeast corner of the Province. A number of regional meetings were organized at various field locations to focus attention on the exploration and development potential of those regions.

MINFILE, the Ministry's computerized mineral inventory database, contains descriptions of 10,340 mineral occurrence localities. More than 5,300 have been updated to modern standards and about 4,200 of these have been proofed and released to the public. The Geological Survey Branch provides personal computer software free to users of the system. The MINFILE/pc program (version 2.13) has searching, reporting, and utility modules. The next version (3.0) will have a data entry/browse module and will be released in late 1990. Through a Partners-in-Enterprise Agreement with SHL Systemhouse Inc., the design and software for the system are being marketed and will be used by Indian and Northern Affairs Canada for the Yukon.

COALFILE is a computerized database in which coal information is summarized for easy efficient access and is available in diskette or tape format.

The 1989/90 Prospectors Assistance and Training program continued to offer cash grants in aid to prospectors and to provide the only advanced prospectors training available in the Province. Total budget for the program was $500,000. The maximum grant available was raised to $7,500 from $5,000. Grants were awarded to 84 prospectors, totalling $409,800. The training program included support to eight introductory courses in addition to the very successful advanced course which was delivered for the 14th consecutive year to a class of 32 students. A new, yet more advanced course, "Petrology for Prospectors" was offered in co-operation with the Smithers Exploration Group to a class of 16 students. As in past years, the prospecting activity under the grant program generated prospects that warranted further exploration by mining companies.

Engineering and Inspection Branch

During 1989/90, 2,827 inspections of mineral and coal mines, exploration sites, placer mines, rock quarries and sand and gravel operations were performed.

A major safety audit was conducted at a large underground mine which resulted in 80 recommendations for improvement in all aspects of mine safety. The audit was well received by both management and labor and similar safety audits will be performed at other mines in the Province.

A unique extended hours of work study commenced in collaboration with the U.S. Bureau of Mines and Simon Fraser University. This study has been described as the most extensive and ambitious piece of research of extended workdays of its sort attempted in the industrial sector.

The introduction of the Workplace Hazardous Materials Information System (WHMIS) legislation has proceeded smoothly and work will continue to ensure that the legislation is fully implemented at all mines in the Province.

The Branch sponsored the Regional and Provincial Mine Rescue Competitions with total involvement of industry personnel as officials at the regional level, and increased participation of industry personnel as officials at the provincial competition. Industries other than mining have expressed interest in rescue competitions and it is planned to involve these industries in competitions in the future.

The Mines Act passed third reading of the legislature in July 1989. The tripartite committee developing the accompanying Health, Safety and Reclamation Code distributed the draft documents widely and held open house meetings in key centres around the Province to ensure public review and comment. Publication of the new Code is expected in June 1990.

This year marked the 20th year of legislated reclamation of mining disturbances under the Mines Act. In the late 1960s the industry's major coal and base metal mines occupied less than 1,000 hectares in total compared to 29,779 hectares in 1989. In the same period 7,332 hectares (25 per cent) have been reclaimed.

The British Columbia Acid Mine Drainage (AMD) Task Force, chaired by the Branch, fostered 13 research projects that were cost-shared with industry. The "AMD Technical Guide" produced in 1988 is in great demand and formed the textbook for several technology transfer workshops in British Columbia, Yukon Territory, Ontario, Quebec, New Brunswick and Indonesia, further demonstrating the Province's place on the leading edge of developing viable solutions to this worldwide problem. Stage II of the Ministry's major AMD research project at the abandoned Mt. Washington site on Vancouver Island was also completed.

The Branch sponsored a biennial Mechanical/Electrical Symposium with representation from industry, manufacturing and government to address the problem of unsatisfactory performance of non-asbestos brake linings during qualification tests on off-road haulage trucks. The symposium provided the catalyst for solving this problem during the following months.

Other projects underway in the Mechanical Engineering and Materials Handling Section included remote control of equipment, vital signs monitoring, the effect of exhaust particulate filters on engine performance and the predication of brake lining friction coefficients.

In a continued commitment to enhance service to industry and to the public through the effective management of information resources, the Branch created and filled the position of Head, Information Systems. Several computerized systems are operational or under development, which analyze health, safety and environmental factors that are vital to the mining industry. A prototype of the "Mine Accident Reporting System", developed in the Branch, was presented to the national Mine Accident Database Working Committee in Ottawa, and will provide the mechanism for involving other provinces in the nationwide system. British Columbia is setting the standard for mine accident reporting in Canada, and will benefit from drawing on national experience in its accident prevention program.

During 1989/90, several projects moved closer to production decisions under the Mine Development Review Process, the Province's procedure for reviewing mining proposals. Nine mine projects received approval-in-principle and advanced to Stage III (the licencing stage).

Mineral Resources Division

Prominent in the review process in 1989/90 were:

- the Fording (South Spoil) Coal Project, which received approval-in-principle in August, 1989;
- the Bearcub Feldspar project, which received approval-in-principle in August, 1989;
- the Sulphurets Gold/Silver Project, which received approval-in-principle in September, 1989; and
- the SNIP Gold Project, which received approval-in-principle in January, 1990.

The number of submissions filed declined slightly from 35 in 1988/89 to 27 in 1989/90.

The formalization of the regional committee system continued in 1989/90. Six regional Mine Development Review Committees have been established to help expedite the review and approval of small, relatively non-controversial mine projects. Regional committees are based in Nanaimo, the Lower Mainland, Kamloops, Fernie/Nelson, Prince George and Smithers. Of the nine projects that received approval-in-principle, four were granted by the regional committees. These included the following projects: Laredo Limestone; International Shasta/Baker Gold; Hellroaring Feldspar (bulk sample); and Nanaimo Coal.
A comprehensive evaluation of the review process was initiated in 1989 and will continue into 1990.

Mineral Titles Branch

The existing Mining Right of Way Act was repealed and replaced with new legislation which complements the Mineral Tenure Act. The Act provides a comprehensive legislated framework for the use of mining access roads by free miners, by the Crown and by other users, and for the use of existing roads by mining interests.

An amendment was made to section 35(2) of the Coal Act which makes provision for reports relating to coal exploration activities to be submitted to the Minister of Energy, Mines and Petroleum Resources. In conjunction with other amendments, this will allow a revision to the Coal Act Regulations which deal with coal geology reports, the confidentiality of the information supplied and the qualifications of the author.

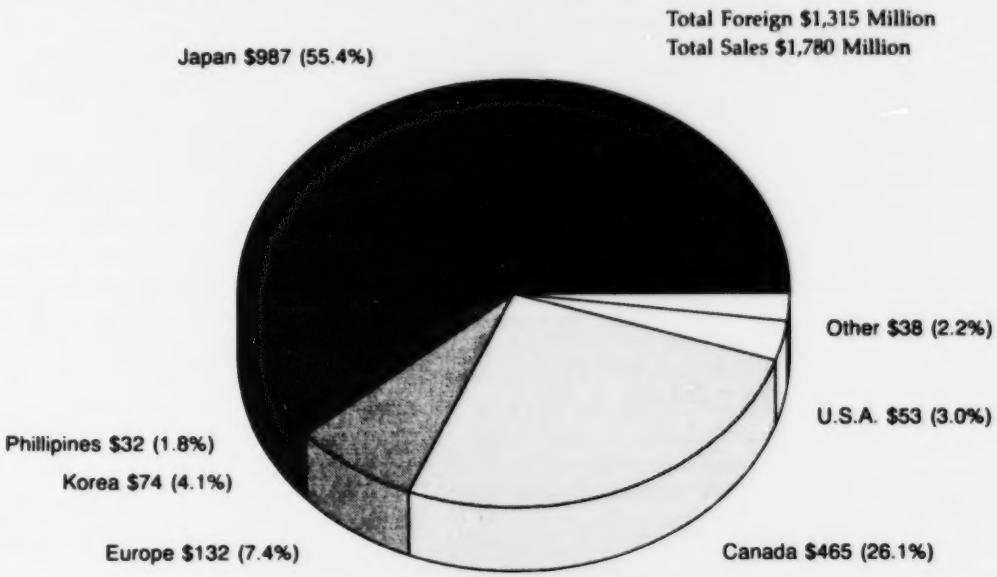
The Branch embarked on a new initiative called "Titles 2000" that will pave the way for an effective and efficient mineral tenure system over the next decade. The initial planning and funding for the project are in place. Planning and development will proceed through 1990/91 and implementation will occur in 1992. This initiative includes: consolidating the 24 existing mining divisions to six; implementing a new computer system; digitizing of 3,000 claim maps and restructuring of the Victoria-based infrastructure.

One of the major benefits of the initiative will be the availability of data to all mining recorders (Government Agents) in the Province.

The Branch recorded 13,620 claims in 1989. This level of activity is up 11 per cent over 1988. Significant increases in staking occurred in the Iskut River-Eskay Creek area north of Stewart. The Chief Gold Commissioner received approximately 50 complaints under Section 35 of the Mineral Tenure Act in this area. To date 12 disputes have been resolved and the remainder will be addressed in the 1990 field season.

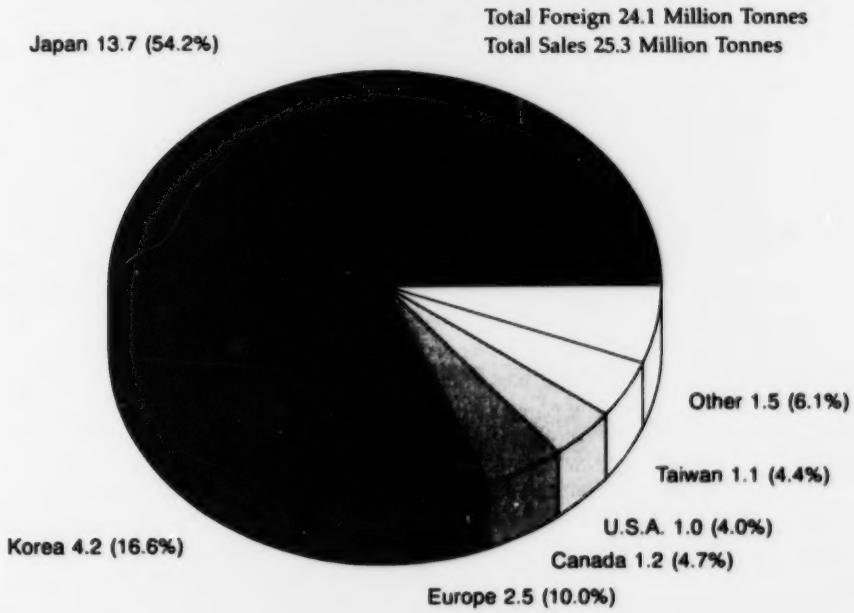
The Branch disposed of 659 Crown-granted 2-post claims in a first-ever mineral claim sale. The claims, accumulated by the Crown over the years, were offered for sale by sealed bid and the highest bidder received title to the claim. Future dispositions of such claims will be advertised in the Provincial Gazette.

Destination of Metals Shipped from B.C. Mines in 1989 ($ Millions)



NOTE: All figures are preliminary; metals are shipped in ores/concentrates.

Destination of Coal Shipped from B.C. in 1989 (Million Tonnes)



NOTE: All figures are preliminary.

Mineral Production in British Columbia, 1988 and 1989

	1988 Actual		1989 Estimate	
	Quantity	$ Value	Quantity	$ Value
Metals				
Copper kg	353,481,625	1,117,031,341	303,221,000	1,005,907,000
Gold g	12,772,640	229,238,857	14,985,000	227,960,000
Iron Concentrates t	59,458	2,203,210	63,000	2,122,000
Lead kg	105,296,208	74,349,472	73,792,000	49,409,000
Molybdenum kg	12,924,198	116,005,450	13,319,000	111,022,000
Silver g	423,440,789	112,539,299	528,711,000	111,124,000
Zinc kg	139,377,351	212,299,874	129,740,000	263,835,000
Others	—	12,106,241	—	8,943,000
Total Metals	—	1,875,773,744	—	1,780,322,000
Industrial Minerals				
Asbestos t	109,139	54,240,546	108,000	57,800,000
Sulphur t	510,307	43,134,889	575,000	61,639,000
Others	—	14,086,830	—	12,982,000
Total Industrial Minerals	—	111,462,265	—	132,421,000
Structural Materials				
Cement t	1,519,634	106,494,497	1,564,000	107,510,000
Sand and Gravel t	48,517,177	120,241,876	50,395,000	127,181,000
Others	—	31,420,330	—	30,795,000
Total Structural Materials	—	258,156,703	—	265,486,000
Coal t	24,813,082	978,811,603	25,520,000	1,040,099,000
Totals	—	3,224,204,315	—	3,218,328,000

Mineral Claims Staked By Mining Division — April 1989 — March 1990

Mining Division	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Totals
Alberni	22	31	82	12	11	21	11	18	1	11	16	50	286
Atlin	58	19	38	48	38	141	36	36	58	31	47	72	622
Cariboo	141	224	174	155	192	188	231	159	118	89	62	151	1,884
Clinton	17	27	14	17	56	65	33	34	13	6	25	46	353
Fort Steele	59	51	75	53	27	55	145	107	19	34	192	232	1,049
Golden	6	20	2	30	8	37	14	4	1	2	27	22	173
Greenwood	74	31	27	18	18	49	20	9	10	28	6	82	372
Kamloops	65	68	100	77	115	72	52	71	55	68	18	54	815
Liard	129	59	27	80	74	218	141	11	16	60	309	219	1,343
Lillooet	27	19	25	10	25	30	30	8	6	7	22	59	268
Nanaimo	48	12	165	18	28	18	27	19	16	22	21	48	442
Nelson	62	84	122	40	60	55	45	17	14	9	3	91	602
New Westminster	17	45	14	22	29	43	12	34	36	31	20	52	355
Nicola	7	16	13	15	11	8	17	28	13	8	17	12	165
Omineca	156	190	127	142	131	121	159	73	93	48	62	183	1,485
Osoyoos	25	12	3	38	18	30	25	31	9	12	3	22	228
Revelstoke	29	27	12	12	23	35	68	12	16	4	0	36	274
Similkameen	33	78	40	48	39	72	72	9	21	9	3	10	434
Skeena	91	55	100	31	70	221	121	65	66	107	22	341	1,290
Slocan	49	26	33	35	14	41	83	9	10	0	5	67	372
Trail Creek	25	10	10	10	23	12	13	4	24	7	8	11	157
Vancouver	6	10	36	25	12	18	34	32	17	6	83	36	315
Vernon	21	12	26	10	44	9	16	6	2	0	2	11	159
Victoria	26	10	18	20	18	9	1	6	19	6	27	17	177
Totals	1,193	1,136	1,283	966	1,084	1,568	1,406	802	653	605	1,000	1,924	13,620

Provincial Revenue from the Mining Industry ($ Thousands)

	1985/86	1986/87	1987/88	1988/89	1989/90*
Claims, Coal Licences and Rentals	4,649	6,530	7,366	7,120	9,000
Coal, Minerals and Metals Royalties	23,821	24,087	22,795	24,724	23,000
Mineral Land Tax	18,622	16,507	12,215	12,656	12,000
Mineral Resource Tax	4,968	8,016	10,418	26,431	38,000
Mining Tax	4,113	445	792	3,719	2,000
Totals	56,173	55,585	53,586	74,650	84,000

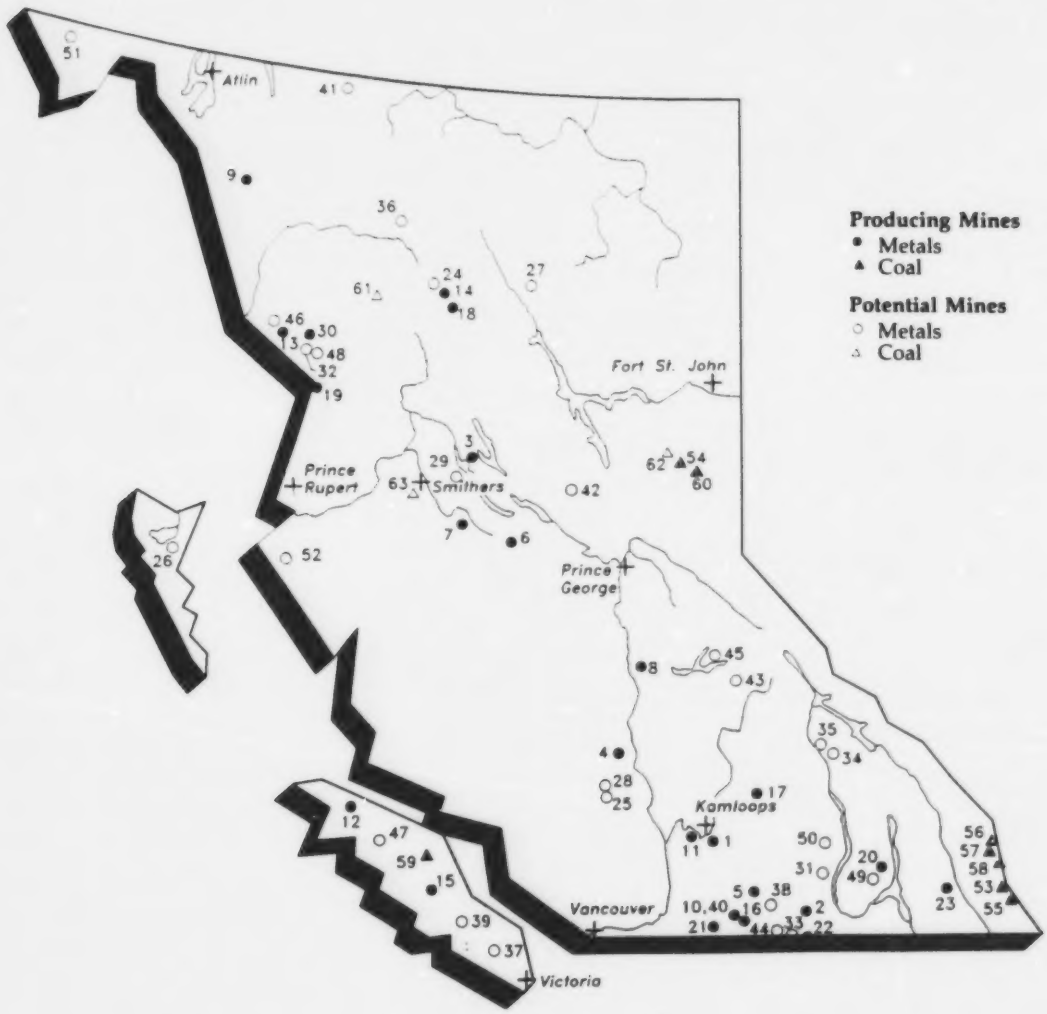
NOTE: *Estimate.

Employment in the Mineral Industry in British Columbia 1985 to 1989

	Metal Mines and Smelters	Coal	Structural Materials	Industrial Minerals	Other	Totals
1985	8,102	5,821	907	410	4,262	19,502
1986	7,712	5,210	983	419	3,650	17,974
1987	8,380	5,144	1,069	411	6,320	21,324
1988	9,149	5,225	1,100	385	4,500	20,359
1989*	9,000	5,620	1,200	450	4,000	20,270

NOTE: *Estimate.

Major Producing Mines and Selected Potential Mines, 1989/90



Producing Metal Mines

1. Afton (Cu, Au, Ag)
2. Beaverdell (Ag, Pb, Zn)
3. Bell (Cu, Au, Ag)
4. Blackdome (Au, Ag)
5. Brenda (Cu, Au, Ag, Mo)
6. Endako (Mo)
7. Equity (Ag, Au, Cu)
8. Gibraltar (Cu, Au, Ag, Mo)
9. Golden Bear (Au, Ag)
10. Hedley Tailings (Au)
11. Highland Valley Copper (Cu, Au, Ag, Mo)
12. Island Copper (Cu, Au, Ag, Mo)
13. Johnny Mountain (Au, Ag)
14. Lawyers (Au Ag)
15. Myra Falls (Cu, Zn, Au, Ag)
16. Nickel Plate (Au)
17. Samatosum (Ag, Au)
18. Shasta (Au)
19. Silbak Premier/Big Missouri (Au, Ag)
20. Silvana (Pb, Zn, Ag)
21. Similco (Cu, Au, Ag)
22. Skylark (Au)
23. Sullivan (Pb, Zn, Ag)

Potential Metal Mines

24. Al (Au)
25. Bralorne (Au)
26. Cinola (Au, Ag)
27. Cirque (Pb, Zn, Ag)
28. Congress (Au, Ag)
29. Dome Mountain (Au, Ag)
30. Eskay Creek (Au)
31. Esperanza (Au)
32. Gold Wedge (Au, Ag)
33. Golden Crown (Au, Cu)
34. Goldstream (Cu)
35. JL/Equinox (Au, Ag, Pb, Zn)
36. Kutcho Creek (Cu, Zn, Ag)
37. Lara (Au, Zn, Cu)
38. Lumby (Au, Ag)
39. Macktush Creek (Au, Ag, Cu)
40. Mascot Tailings (Au)
41. Midway (Ag, Pb, Zn)
42. Mount Milligan (Cu)
43. Mount Polley (Cu)
44. Oliver (Au)
45. Quesnel River (Au)
46. Snip (Au, Ag)
47. Spud (Au)
48. Sulphurets (Au, Ag)
49. Willa (Au, Cu)
50. Windflower (Au)
51. Windy Craggy (Cu, Co, Au, Ag, Zn)
52. Yellow Giant (Au, Ag)

Producing Coal Mines

53. Balmer
54. Bullmoose
55. Byron Creek
56. Fording
57. Greenhills
58. Line Creek
59. Quinsam
60. Quintette

Potential Coal Mines

61. Mount Klappan
62. Sukunka
63. Telkwa

Major Industrial Minerals Operations, 1989/90

Production Greater that 1,000,000 tonnes per year
Production between 100,000 and 1,000,000 tonnes per year
Production less than 100,000 tonnes per year
Potential producer under mine development review process
Recent past producer

Production greater than 1,000,000 tonnes per year

1. Blubber Bay (limestone)
2. Cassiar (asbestos)
3. Gillies Bay (limestone)

Production between 100,000 and 1,000,000 tonnes per year

4. Imperial (limestone)
5. Kamloops (limestone)
6. Lussier River (gypsum)
7. Mt. Brussilof (magnesite)
8. Mt. Moberly (silica)
9. Nanaimo (shale)
10. Nicholson (silica)
11. Pavillion Lake (limestone)
12. Windermere (gypsum)

Production less than 100,000 tonnes per year

13. Arthur Point (rhodonite)
14. Beaverdell (granite)
15. Benson Lake (calcite)
16. Cayoosh Creek (granite)
17. Craigmont (magnetite)
18. Crawford Bay (dolomite)
19. Dahl Lake (limestone)
20. Keremeos (rhodonite)
21. Kutcho Creek (jade)
22. Lost Creek (calcite)
23. Ogden Mountain (jade)
24. Oliver (silica)
25. Parson (barite)
26. Princeton (pyrophyllite)
27. Purden Lake (limestone)
28. Red Lake (fullers earth)
29. Rock Creek (dolomite)
30. Salmo (flagstone)
31. Squamish (granite)
32. Sumas Mountain (fire clay)

Potential producer under Mine Development Review Process

33. Argonaut (garnet)
34. Crystal Peak (garnet)
35. Hellroaring Creek (feldspar)
36. North Bend (talc)

Recent past producers

37. Frenier (perlite)
38. Hill 60 (rhodonite)
39. Knight Inlet (granite)

Revenue and Operational Services Division

THE REVENUE AND OPERATIONAL SERVICES DIVISION

Manages the assessment and collection of taxes and royalties from the mineral and petroleum industries, and provides support for the Ministry's operations and programs.

EXECUTIVE DIRECTOR

MINERAL REVENUES BRANCH

Administers tax regimes for the collection of revenues from the mining industry. Ensures compliance with statutory intent in self-assessing revenue programs through a comprehensive audit process.

PETROLEUM REVENUES BRANCH

Administers tax and royalty regimes for the collection of revenues from the petroleum industry. Ensures compliance with statutory intent in self-assessing revenue programs through a comprehensive audit process.

ADMINISTRATIVE SERVICES BRANCH

Manages office space, field equipment, vehicle fleet, telecommunications, assets, purchasing, and mail services for the Ministry. The Branch also provides the Ministry library services.

INFORMATION SYSTEMS BRANCH

Provides systems services including planning, purchasing, installation and end-user support. It is also responsible for project administration, technical support and data management for the Ministry's natural resources databases.

FINANCIAL SERVICES BRANCH

Provides financial services and direction to the Ministry in the areas of financial reporting, budget preparation, management services, payroll administration, and management information reporting.

PERSONNEL SERVICES BRANCH

Provides services for staff recruitment and selection, employee relations, compensation, staff training and development, and safety programs.

Highlights

Mineral Revenues Branch

The business goal of the Mineral Revenues Branch is to ensure that the Crown receives its fair share of mineral revenues.

The Branch, in co-operation with the Mineral Policy Branch, completed development of the new Mineral Tax Act which became effective January 1, 1990 and replaced several tax and royalty regimes in the mining industry. This new consolidated Act simplifies administrative requirements and benefits both government and industry.

Petroleum Revenues Branch

The Branch provides effective and efficient services to meet the statutory mandate to calculate, verify, collect and report the Crown royalties and taxes payable by the petroleum industry.

Phase I of the Petroleum Royalty Management system was completed. This provides the Ministry with the ability to manage the reporting of production, calculation and collection of royalties on petroleum and natural gas.

Phase II of the Petroleum Royalty Management System, which provides reports for the validating of royalty calculations, was 80 per cent completed.

The external audit plan and methodology was developed to ensure that the self-assessing royalty system met statutory requirements.

Administrative Services Branch

The Branch completed a number of support requirements for the Ministry's new consolidated office building in Victoria. These included agreement and development on an energy efficient design for the building; completion of the leased building requirements document (LBRD); establishment of the Ministry Design and Planning Committee to receive wide representative input from ministry staff; and, development of an open-space furniture design for use in the new building.

On other accommodation issues, the Branch has been involved in the consolidation of the Vancouver offices in a new location, and establishment of a new Ministry office in Cranbrook.

The Branch participated in a decentralized Suggestion Awards Program (SARA) and oversaw the process to initiate privatization of mail services in Victoria. In consultation with representatives from Personnel Services and Engineering and Inspection, the Branch began the process of developing a policy and procedure guidelines for earthquake preparedness plans.

The Branch also participated with the Purchasing Commission in the development of a Purchasing Commission Handbook for all government employees and designed a new Ministry telephone directory for wide distribution to staff and industry clientele.

Information Systems Branch

In 1989, the Ministry continued to focus its systems efforts on the implementation of the new Petroleum Royalty Management System. This two-year project included the simplification of the royalty formula, the reorganization of the Petroleum Revenues Branch, and a $2-million systems project. The new revenue system went into operation in September 1989, and was followed by a module to validate and audit royalties in March 1990. The Ministry also implemented a new system to administer petroleum titles and leases. Both these systems were completed by private sector contractors working under the direction of Ministry officials.

To meet the needs of the large number of new users of personal computers and electronic mail terminals, the Information Systems Branch established a formal "Help Desk" to co-ordinate requests for information, assistance and new orders. A section manager and additional technical staff were secured to support Ministry operations.

Financial Services Branch

In 1989/90 the Branch commenced a pilot test of Office Management System (OMS) software. If the pilot test proves successful, a recommendation to proceed with ministry-wide implementation in fiscal year 1990/91 will be made.

This software provides a degree of decentralization in financial management by allowing Ministry managers and staff to enter commitments and expenditures as soon as they are incurred, to transfer the data to the Ministry's GMACS financial system, and to run ad hoc reports and supplier inquiries on their own computer equipment.

Personnel Services Branch

The Branch provides services in all areas of human resources management within the Ministry including staffing programs, organizational analysis, compensation, employment policy, labor relations, training, development, and workplace health and safety.

Key activities during the year included providing support to management in classifying and staffing of new positions, in estimates, and in improving the Ministry approach to staff training and development.

Revenue and Operational Services Division

Ministry Expenditures — Standard Expenditure Classifications

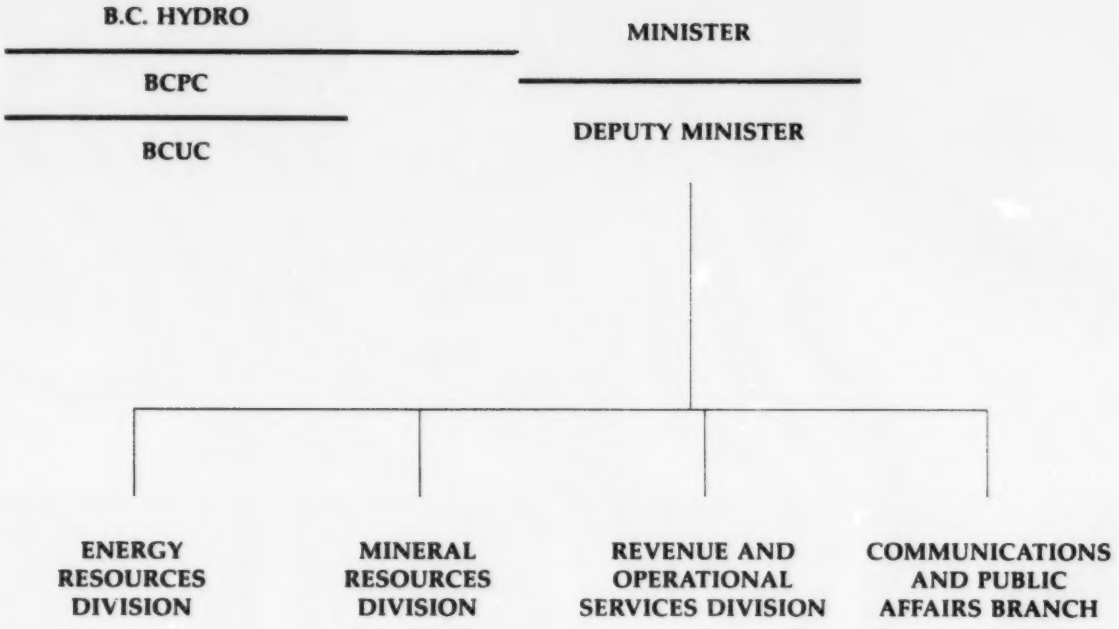
	Fiscal Year 1988/89	Fiscal Year 1989/90*
Salaries	$12,017,758	$15,924,037
Supplies and Services	9,801,941	13,353,105
Capital	3,069,586	2,768,049
Other Expenditure (Write Offs)	—	—
Grant (Includes Fort Nelson Revenue Sharing Agreement)	1,137,080	1,023,298
Recoveries (Mineral Development Agreement)	(895,610)	(768,176)
Totals	$28,130,755	$32,300,313

NOTE: *Estimate.

Details of Expenditures by Appropriations and Activities, and by Standard Expenditure Classification

Summary of Expenditures	Fiscal Year 1988/89	Fiscal Year 1989/90*
Minister's Office	$250,591	$282,432
Resource Management Program (Net of Recoveries)		
Executive Management	600,950	551,172
Revenue and Operational Services Division	4,865,603	6,008,499
Energy Resources Division	6,152,527	7,418,009
Mineral Resources Division	14,380,166	16,395,716
Fort Nelson Indian Band Revenue Sharing Agreement		
Statutory	389,744	271,731
Financial Administration Act Sec. 24 (c) — Interest on Revenue Refunds	41,221	1,836
Mines Act Sec. 15 (2) — Mine Improvement	500	—
Mineral Development Agreement (Net of Recoveries)	977,710	877,919
Mineral Exploration Incentives Program	471,765	492,999
Totals	$28,130,755	$32,300,313

NOTE: *Estimate.


B.C. HYDRO
BCPC
BCUC
MINISTER
DEPUTY MINISTER
ENERGY RESOURCES DIVISION
MINERAL RESOURCES DIVISION
REVENUE AND OPERATIONAL SERVICES DIVISION
COMMUNICATIONS AND PUBLIC AFFAIRS BRANCH

Ministry Overview

The Ministry is divided into three divisions for operating purposes: Energy Resources, Mineral Resources, and Revenue and Operational Services. The three Division heads, along with the Director of Communications and Public Affairs Branch, report directly to the Deputy Minister.

The Ministry had 357 full-time equivalent (FTE) positions for the 1989/90 fiscal year. The FTEs are primarily used for permanent regular full-time positions with a small portion of the FTEs being used for seasonal geological field work staff.

Communications and Public Affairs Branch

The Communications and Public Affairs Branch supports the Ministry and each Division and Branch through planning, development and delivery of communication programs. This is done through advice, co-ordination and technical assistance to define target audiences, design, produce and distribute communication materials, and provide later evaluation and follow-up.

The Branch is also the Ministry's focus for general public inquiries (both telephone and mail), media relations, issue management and advertising. In 1989/90 the Branch produced or assisted with the following initiatives:

- news releases and media alerts (51), industry information letters (31), advertisements (7), press conferences, receptions and other events (6);
- printed brochures, pamphlets, booklets, Annual Reports, Business Plans (37);
- conferences, exhibits, tradeshows (8);
- communication training seminars for Ministry staff (3).

The public is keenly interested in energy efficiency, mining production and reclamation, petroleum exploration and development and, in particular, how these issues relate to a healthy provincial economy and environment. The Branch will continue to ensure the public's needs are met through ongoing communication programs.

Forum on the Economy and Environment

A Deputy Minister's Forum is in place to provide a cross-disciplinary focal point for staff engaged in resource management, integrated project review, and inspection and reclamation. The Forum also provides an avenue for interchange with other government-wide economy and environment initiatives.

Women's Programs

The Ministry's Women's Program Working Committee has prepared an action plan to encourage and assist women in the Ministry in career planning and advancement and to ensure equal treatment of all employees. The committee will carry out its mandate by ensuring women have equal access to job advancement and career development opportunities, and by raising awareness of existing opportunities.

Legislation

Legislation administered by the Ministry of Energy, Mines and Petroleum Resources includes the following:

Coal Act
Economic Development Electricity Rate Act
Energy Efficiency Act
Fort Nelson Indian Reserve Minerals Revenue Sharing Act
Gas Utility Act
Geothermal Resources Act
Hydro and Power Authority Act
Hydro and Power Authority Privatization Act
Hydro Power Measures Act
Indian Reserve Mineral Resource Act
Mineral Land Tax Act
Mineral Prospectors Act
Mineral Resource Tax Act
Mineral Tax Act
Mineral Tenure Act
Mines Act
Mining Right of Way Act
Ministry of Energy, Mines and Petroleum Resources Act
Natural Gas Price Act
Petroleum and Natural Gas Act
Petroleum and Natural Gas/Vancouver Island Railway Lands Act
Petroleum Corporation Act
Pipeline Act
Power Act
Utilities Commission Act
Vancouver Island Natural Gas Pipeline Act

Ministry Staffing List (as of March 31, 1990)

Minister's Office

Honourable Jack Davis, Minister

Deputy Minister's Office

Douglas H. Horswill, Deputy Minister
Irwin Henderson, Director, Communications Branch

Energy Resources Division

John Allan, Assistant Deputy Minister
Gordon Douglas, Executive Advisor
Warren Bell, Director, Energy Management Branch
Joan Hesketh, Director, Oil and Gas Policy Branch
Phil Carter, Director, Electricity Policy Branch
Peter Ostergaard, Director, Energy Project Analysis Branch
Bruce Hanwell, Director, Engineering and Operations Branch
John MacRae, Director, Petroleum Geology Branch
Gerald German, Director, Petroleum Titles Branch

Mineral Resources Division

Bruce McRae, Assistant Deputy Minister
John Clancy, Director, Mineral Policy Branch
Denis Lieutard, Acting Director, Mineral Titles Branch
Ralph McGinn, Director, Engineering & Inspection Branch
Geological Survey Branch:
- Ron Smyth, Chief Geologist
- Gib McArthur, Manager, Resource Data & Analysis
- Bill McMillan, Manager, Mineral Deposits & Regional Mapping
- Vic Preto, Manager, District Geology & Coal Resources
- Paul Matysek, Acting Manager, Environmental Geology

Revenue and Operational Services Division

Bob Cook, Executive Director
Alf Lockwood, Director, Mineral Revenues Branch
Bruce Garrison, Director, Petroleum Revenues Branch
Timothy Chatton, Director, Administrative Services Branch
Alan Guibault, Director, Information Systems Branch
Jennifer Smith, Director, Financial Services Branch
Barry Turner, Director, Personnel Services Branch

Ministry Staffing List — *Continued*

District Offices

- Fernie
- Fort St. John (Charlie Lake)
  - Mediation & Arbitration Board
- Kamloops
- Nanaimo
- Nelson
- Prince George
- Quesnel
- Smithers
- Vancouver:
  - Mineral Titles
  - Engineering & Inspection Branch
  - Geological Survey Branch